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# UNITS OF LIVESTOCK PRODUCTION

## A Measure of Grain Consumption at the National Level

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# UNITS OF LIVESTOCK PRODUCTION

## A Measure of Grain Consumption at the National Level

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### Purpose of Production Units

To learn the potential production of livestock and livestock products in a given period necessitates the consideration of the available supplies of feed grains and feed concentrates and the supplies that would be required for a specified level of production. To relate feed supplies to livestock production, it is necessary to combine all the different species and kinds of livestock and poultry and express the result in units that requires about the same quantity of feed concentrates from year to year.

Two devices have been developed in the Department of Agriculture in order to calculate the quantity of grain and concentrates needed in a year for all the livestock in the country, or to find out how much livestock a given quantity of feed will support. Each of these devices has certain advantages and disadvantages.

One of these devices is the animal unit of grain-consuming livestock fed in a year. 1/ It is calculated from the number of livestock fed during the year including the number on farms January 1, and all the livestock and poultry raised during the year. It is based on the feed concentrates required for one milk cow for a year. This unit of measurement does not take into account the changes in weights of animals fed or the changes in production per head, such as milk per cow and eggs per hen.

Because of the disadvantages of the animal unit computed on the basis of livestock numbers only, a unit has been developed that is based on the grain required to obtain a given volume or quantity of production of animals and animal products; this is called a production unit. It is based on the feed concentrates required in producing 4,400 pounds of milk which is the 10-year average quantity of milk produced per cow in the United States. (See table 1.)

The production unit is suited for measuring or ascertaining the total quantity of grain and other concentrates required to produce a given quantity of milk, eggs, meat, etc., during a given period for the United States as a whole. It is not suited for this purpose if applied to different States or regions, for the grain requirements of livestock differ widely in different parts of the country. Although the production unit is

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1/ See report, "Animal Units of Livestock Fed Annually," F.M. 64, Bureau of Agricultural Economics, November 1947.

a device for use in measuring the grain requirements of livestock and relating supplies of feed grain to the production of livestock and livestock products, it does not take into account the contribution of hay, pasture, and other roughage to livestock production and so is not suitable for measuring such production from these feed resources.

The production unit is a somewhat more accurate device than the animal unit for calculating the feed concentrates needed at the national level; in addition, it may be used to estimate these requirements by quarters of a year. The animal units, on the other hand, can be used in making estimates by States or regions of grain-consuming livestock fed annually, but it is not adapted for use when parts of a year are considered.

Table 1.- Comparison of livestock production units (from grain) and animal units of grain-consuming livestock on farms fed annually, year beginning October 1, 1924-1946

| Year beginning October 1 | Production units | Animal units fed | Production units divided by animal units |
|---|---|---|---|
| | Thousand units | Thousand units | Percent |
| 1924 | 141.1 | 150.7 | 93.6 |
| 1925 | 141.8 | 148.9 | 95.2 |
| 1926 | 144.3 | 152.4 | 94.7 |
| 1927 | 146.6 | 153.0 | 95.8 |
| 1928 | 145.5 | 152.7 | 95.3 |
| 1929 | 145.7 | 153.6 | 94.9 |
| 1930 | 146.4 | 152.4 | 96.1 |
| 1931 | 148.1 | 156.0 | 94.9 |
| 1932 | 150.0 | 159.5 | 94.0 |
| 1933 | 140.5 | 153.7 | 91.4 |
| 1934 | 122.4 | 131.1 | 93.4 |
| 1935 | 130.3 | 138.5 | 94.1 |
| 1936 | 130.8 | 137.4 | 95.2 |
| 1937 | 141.5 | 137.6 | 102.8 |
| 1938 | 144.9 | 148.5 | 97.6 |
| 1939 | 153.4 | 156.0 | 98.3 |
| 1940 | 155.3 | 155.9 | 99.6 |
| 1941 | 170.0 | 167.3 | 101.6 |
| 1942 | 193.5 | 192.4 | 100.6 |
| 1943 | 191.3 | 193.1 | 99.1 |
| 1944 | 176.4 | 173.7 | 101.6 |
| 1945 | 175.0 | 167.7 | 104.4 |
| 1946 | 169.9 | 161.3 | 105.3 |

## Method of Computation

The livestock production unit measures the production of all livestock combined, that comes from grain or other concentrate feeds, in terms of the production of the average milk cow. The production units are calculated from the pounds of milk, and pounds of hogs, broilers, and turkeys produced, from the number of eggs produced and pounds of chickens raised, and from the number of young dairy cattle on farms January 1, the number of cattle on feed January 1, other beef cattle on farms January 1 (cattle other than cattle on feed, milk cows and dairy heifers and calves), and from the numbers of sheep and lambs on feed January 1, stock sheep on farms January 1, horses and mules 2 years old and over on farms January 1, and the number of colts on farms January 1.

There are official estimates for all of these items except in the case of the pounds of chickens raised and this may be calculated by multiplying the number of chickens raised by the average weight of chickens sold. The reason for using the number of cattle on feed January 1, sheep on feed January 1, and horses and mules on farms January 1, is that there are no official estimates of the production of grain-fattened cattle or grain-fattened sheep or lambs, or of power produced by work animals. As most of the concentrates fed to stock sheep and to cattle other than milk cows and cattle on feed is fed during the winter, the number of these animals on farms January 1 is used to measure the consumption of concentrates.

The base used in calculating production units is the 10-year average (1937-38 to 1946-47) pounds of concentrates (1,312) used by the average milk cow (on farms January 1) in producing 4,400 pounds of milk in a year. Table 2 gives the 10-year average number of pounds of concentrates used in the production of, and the production unit factors for, 100 pounds of each of the livestock or livestock products, and for 100 eggs, and for one head of the other livestock.

The rates of feeding and the factors are averages for the United States; they are not applicable to individual States or regions.

One unit of livestock production is equal to the following production:

4,400 pounds milk
288 pounds hogs, live weight
256 pounds chickens raised, live weight
311 pounds broilers raised, live weight
246 pounds turkeys raised, live weight
183 dozen eggs

One unit of livestock production is also equal to the following head of livestock on farms, January 1:

| | |
|---|---|
| .45 | cattle on feed |
| 2.60 | heifers and heifer calves kept for milk |
| 6.10 | cattle other than cattle on feed, milk cows and heifers and heifer calves kept for milk |
| 8.0 | sheep and lambs on feed |
| 37.5 | stock sheep |
| .75 | horses and mules, 2-years old and over |
| 6.5 | colts |

Table 2.- Pounds of concentrates used per unit of product or per head and production unit factors, average 1937-38 to 1946-47

| Item | Pounds of concentrates per unit or per head annually 1/ | Production unit factor |
|---|---|---|
| 100 lbs. milk | 29.8 | .0227 |
| 100 lbs. hogs live weight | 455 | .347 |
| 100 lbs. broilers produced | 422 | .32 |
| 100 lbs. turkeys produced | 534 | .41 |
| 100 lbs. chickens raised | 513 | .39 |
| 100 eggs produced | 59.6 | .045 |
| 1 head heifers and heifer calves kept for milk on farms, January 1 | 505 | .39 |
| 1 head cattle on feed, January 1 | 2,900 | 2.2 |
| 1 head other cattle on farms, January 1 | 215 | .16 |
| 1 head sheep and lambs on feed, January 1 | 165 | .125 |
| 1 head stock sheep on farms, January 1 | 35 | .027 |
| 1 head horses and mules 2 years old and over on farms, January 1 | 1,760 | 1.3 |
| 1 head colts on farms, January 1 | 200 | .15 |

1/ The feeding rates are 10-year average U. S. rates; they exclude seeds, skim milk, and corn in silage. The rate for cattle on feed January 1 and sheep and lambs on feed January 1 allow for all cattle and sheep that are grain fattened during the year.

Each of these quantities of livestock production used about the same quantity of feed concentrates in its production, and the numbers given of each kind of livestock used about the same quantity of feed concentrates, based upon average rates of feeding of the last 10 years.

The number of livestock production units on farms in the United States for any year may be computed by multiplying the annual production of each of the livestock or livestock products and the number of livestock on January 1 of that year by the appropriate factors.

Production units are used principally to estimate the quantity of feed required for a given future volume of livestock production. As the feeding year begins on October 1 it is necessary to calculate the production units for the year beginning on that date. This is possible to do because the production units are calculated for each quarter of a year, and the four quarters that begin with October 1 are added, to obtain the total for the feeding year. The quarterly figures are also useful when the disappearance of feeds by quarters is being compared, or when the future feed requirements by quarters of the year are being estimated.

The quarterly distribution of production units is estimated for each class of livestock, except hogs, by applying the percentages shown in table 3 to the total production units for the year. For instance, it is estimated that 28 percent of all concentrates used in producing eggs in a year is fed in the first quarter and 32 percent is fed in the last quarter. The corresponding figures for milk are 35 percent and 30 percent. These percentages do not represent the percentage of the production occurring in the different quarters, especially in the case of cattle and sheep.

Of course there is some variation from year to year in these percentages but for the purpose of combining several kinds of livestock they are satisfactory. The official estimates of milk and poultry production are reported for the calendar year and the percentages apply to different quarters of the calendar year. In the case of cattle, sheep, and horses and mules, where the number on hand January 1 is used in calculating production units, the total production units for the year are for the 12 months (beginning October 1) in which the January in question falls. The percentages are applied to the quarters beginning October 1, as shown in table 3.

When working with hogs it is not sufficiently accurate to use the percentage of the yearly production by quarters. The great variation in production, due to changes in the pig crops and in weights of hogs marketed, and the fact that hogs use such a large proportion of the total concentrates fed in this country make that method undesirable. The Bureau of Agricultural Economics estimates the net live weight production of hogs for the calendar year just past. A method of estimating the net live weight production for the calendar year in advance, and by quarters of the year is given in table 4. The factors used are the numbers of hogs on farms January 1, the number of pigs saved during the year, and the average weight of barrows and gilts marketed at seven

Table 3.- Estimated percentage distribution of concentrates fed to specified classes of livestock by quarters of the year 1/

| Item | October-December | January-March | April-June | July-September | October-December |
|---|---|---|---|---|---|
| | Percent | | | | |
| | Classes, using calendar year for production and percentages | | | | |
| Milk cows | | 35 | 20 | 15 | 30 |
| Laying flocks | | 28 | 20 | 20 | 32 |
| Chickens raised | | 15 | 20 | 40 | 25 |
| Broilers raised | | 35 | 30 | 15 | 20 |
| Turkeys raised | | 5 | 5 | 45 | 45 |
| | Classes, using January 1 numbers of livestock and year beginning preceding October 1 for percentages | | | | |
| Heifers kept for milk | 50 | 45 | 5 | --- | |
| Cattle, grain fattened | 30 | 40 | 15 | 15 | |
| Other cattle 2/ | 50 | 45 | 5 | --- | |
| Sheep and lambs on feed | 40 | 40 | 10 | 10 | |
| Stock sheep | 40 | 60 | | | |
| Horses and mules, and colts | 25 | 20 | 30 | 25 | |

1/ In the years before 1938 the following percentage distribution was used for milk cows and laying flocks:

Milk cows - January - March 36, April - June 18, July - September 11, October - December 35.

Laying flocks - January - March 30, April - June 18, July - September 15, October - December 37.

2/ All cattle other than milk cows, heifers, and heifer calves kept for milk and cattle that were grain fattened.

Table 4.- Estimating the live weight production and the production units of hogs, by quarters, 1944

| Item | Number of hogs | Weight per head: Beginning of year | Weight per head: When slaughtered | Weight per head: End of year | Weight per head: Gain in weight | Total live weight produced: Calendar year | Total live weight produced: January-March | Total live weight produced: April-June | Total live weight produced: July-September | Total live weight produced: October-December |
|---|---|---|---|---|---|---|---|---|---|---|
| | Million head | Pounds | Pounds | Pounds | Pounds | Million pounds | Million pounds | Million pounds | Million pounds | Million pounds |
| Hogs on farms, January 1 | | | | | | | | | | |
| Spring pigs | 30.6 | 190 | 238 | | 48 | 1,469 | 1,469 | | | |
| Fall pigs | 42.3 | 90 | 230 | | 140 | 5,922 | 3,384 | 1,692 | 846 | |
| Sows | 5.4 | 300 | 375 | | 75 | 405 | 135 | 135 | 81 | 54 |
| Gilts | 5.4 | 190 | | 300 | 110 | 594 | 135 | 135 | 162 | 162 |
| Total | 83.7 | | | | | | | | | |
| Hogs from current pig crop on farms December 31 | | | | | | | | | | |
| Spring pigs | 22.9 | | | 190 | 190 | 4,351 | | 458 | 1,374 | 2,519 |
| Fall pigs | 27.2 | | | 90 | 90 | 2,448 | | | 272 | 2,176 |
| Gilts (9.2-5.4) | 3.8 | | | 190 | 190 | 722 | 38 | 114 | 228 | 342 |
| Deaths | 11.8 | | | | | | | | | |
| Sold or unaccounted | 21.0 | | 226 | | 226 | 4,746 | 210 | 840 | 1,575 | 2,121 |
| Pigs saved | 86.7 | | | | | | | | | |
| Live weight produced as calculated | | | | | | 20,657 | 5,371 | 3,374 | 4,538 | 7,374 |
| Live weight produced as reported by B.A.E. | | | | | | 20,583 | | | | |
| Live weight produced by quarters adjusted to B.A.E. total | | | | | | | 5,352 | 3,362 | 4,522 | 7,347 |
| Production units of hogs (thousands) | | | | | | 71,423 | 18,571 | 11,666 | 15,691 | 25,495 |

markets. 2/

The year 1944 is used for illustrative purposes in calculating the net live weight production of hogs. (See table 4.) The total supply of hogs to be accounted for in that year consists of 83.7 million hogs on farms January 1 and 86.7 million pigs saved during the year. The numbers of hogs on farms January 1 consist of three classes: (1) 42.3 million hogs under 6 months old which are from the fall pig crop of 1943; (2) 30.6 million hogs 6 months old and over which are from the spring pig crop of 1943, and (3) 10.8 million sows and gilts, half of which are assumed to be sows and half gilts. The 86.7 million pigs saved during the year are accounted for by (a) 59.3 million hogs on farms at the end of the year minus the sows carried over that were gilts the year before, (b) 11.8 million head that died, and (c) the remainder or 21.0 million hogs that were largely from the spring pig crop and were slaughtered before the end of the year, principally in the last 3 months. It was assumed that the hogs from the spring pig crop on farms January 1 weighed 190 pounds each, and the hogs from the fall crop 90 pounds each, on January 1. Half of the breeding herd was assumed to be of gilts weighing 190 pounds each and half of the sows each weighing 300 pounds.

It was further assumed that the spring pigs on farms January 1 were all sold during the first quarter of the year at the average weight of barrows and gilts at 7 markets 3/ which, in 1944, was 238 pounds. The gain in weight, per head, on the 30.6 million hogs in this class after January 1 was therefore 238-190 pounds, or 48 pounds, or a total of 1,469 million pounds; all of this was put on in the first quarter of the year.

The 42.3 million head of fall pigs were assumed to be slaughtered at the average weight per head of barrows and gilts at 7 markets, from April through September, of 230 pounds. The total gain per head after January 1 was therefore 230-90, or 140 pounds. This was distributed as follows: 80 pounds in the first quarter, 40 pounds in the second quarter, and the remainder, or 20 pounds, in the third quarter of the year. These rates were calculated from normal rates of gain and from the average percentage of the fall crop marketed in each month.

It was assumed that the 5.4 million sows on January 1 would be sold during the year at 375 pounds or a gain of 75 pounds each, and that 25 pounds of gain would be in the first quarter, 25 in the second, 15 in the third, and 10 in the fourth. It was also assumed that the 5.4

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2/ This method gave an average difference in net live weight production from the published estimates of the BAE of 0.5 percent for the 23 years, 1924-46, with a difference of less than 1 percent in 16 of the 23 years. There was a difference of more than 2 percent in only 2 years of the 23 years, 1934 and 1945. Such close estimates could not be expected for, say 1948, especially if it were made before the number of hogs on farms January 1, 1948 was available.

3/ Published in Livestock Market News, Statistics and Related Data, 1946, page 61, PMA, USDA.

million gilts on farms January 1 weighing 190 pounds would be carried over at the end of the year, weighing 300, or with a gain of 110 pounds. The distribution of 110 pounds of gain was 25 pounds in the first quarter, 25 pounds in the second quarter, 30 pounds in the third quarter, and 30 pounds in the fourth quarter.

The next step in the computation is to estimate the gain in weight that was made during the year for the hogs in the inventory on December 31, 1944. 4/ There were 22.9 million spring pigs that averaged 190 pounds. It was estimated that 20 pounds per head was put on in the second quarter, 60 pounds in the third, and 110 pounds in the fourth quarter. There were also 27.2 million head of fall pigs weighing 90 pounds on December 31, 10 pounds of this weight were estimated to have been put on in the third quarter and 80 pounds in the fourth quarter. There were 9.2 million head of sows and gilts in the end-of-year inventory, 5.4 million of which were in the beginning inventory. This leaves 3.8 million gilts that were raised during the year to 190 pounds; 10 pounds were put on in the first quarter, 30 pounds in the second quarter, 60 pounds in the third quarter, and 90 pounds in the fourth quarter.

The 21.0 million head of pigs remaining out of the 86.7 pigs saved after deducting death loss 5/ were spring pigs that were slaughtered before January 1. It was assumed that they had the average weight of barrows and gilts at 7 markets for the months of October through December, or 226 pounds. The distribution of this gain was 10 pounds in the first quarter, 40 pounds in the second quarter, 75 pounds in the third quarter, and the remainder, or 101 pounds, in the fourth quarter.

The total net live weight production of hogs for the calendar year calculated as shown (table 4) totals to 20,657 million pounds, of which 5,371 million pounds were produced in the first quarter, 3,374 million pounds in the second quarter, 4,538 million pounds in the third quarter, and 7,374 million pounds in the fourth quarter. The official net live weight production of hogs, as reported by the Bureau of Agricultural Economics for 1942, was 20,583 million pounds. This was divided among the four quarters in the same proportion as was the 20,657 million pounds.

The production units were calculated for each quarter by multiplying by the factor 0.347 per 100 pounds.

The production units of hogs are now ready to combine with other livestock, as shown in table 5. The production units of hogs in table 4 are transferred to table 5. The production of other livestock products in the calendar year 1944 is shown in column 9. These are multiplied by the factors in table 2 and the results are put in column 6. Then the percentages in table 3 are applied to the figures in column 6, and the results are put in columns 2 to 5 inclusive. The production units for the calendar year are thus distributed by quarters. The production for the October-December quarter 1943 is transferred from the 1943 sheet to column 1 of table 5 (shown in parenthesis).

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4/ From BAE report, "Livestock on Farms," January 1, 1945.

5/ All the death loss in the year was assumed to be in pigs saved and none in the hogs in the inventory on farms January 1.

Table 5.- Calculation of livestock production units, 1943-44 1/

| Item | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | Production units | | | | | | | | |
| | 1943- Oct.- Dec. | 1944 Jan.- March | 1944 April- June | 1944 July- Sept. | 1944 Oct.- Dec. | Calendar year 1944 | Year beginning Oct. 1, 1943 | Number of livestock Jan. 1, 1944 | Production in 1944 |
| | Thousands | | | | | | | Thousand head | Million pounds |
| Milk | (8,021) | 9,374 | 5,357 | 4,018 | 8,035 | 26,784 | (26,770) | | 117,992 |
| Young dairy cattle | 2,645 | 2,379 | 264 | | (2,550) | (5,193) | 5,288 | 13,553 | |
| Cattle on feed | 2,650 | 3,533 | 1,325 | 1,325 | (2,911) | (9,094) | 8,833 | 4,015 | |
| Other beef cattle | 3,220 | 2,898 | 322 | | (3,225) | (6,445) | 6,440 | 40,252 | |
| Hogs | (35,560) | 18,571 | 11,666 | 15,691 | 25,495 | 71,423 | 81,488 | | 20,583 |
| Eggs | (7,854) | 7,375 | 5,268 | 5,267 | 8,428 | 26,338 | (25,764) | | 2/58,530 |
| Chickens raised | (4,100) | 2,093 | 2,790 | 5,582 | 3,489 | 13,954 | (14,565) | | 3,578 |
| Broilers | (533) | 886 | 758 | 379 | 505 | 2,528 | (2,556) | | 790 |
| Turkeys | (954) | 121 | 121 | 1,091 | 1,090 | 2,423 | (2,287) | | 591 |
| Lambs on feed | 326 | 326 | 81 | 81 | (345) | (833) | 814 | 6,512 | |
| Stock sheep | 478 | 717 | | | (428) | (1,145) | 1,195 | 44,270 | |
| Horses and mules, 2 years old and older | 3,827 | 3,062 | 4,593 | 3,827 | (3,644) | (15,126) | 15,168 | 11,668 | |
| Colts | | | | | | | 141 | 945 | |
| Total | 70,168 | 51,335 | 32,545 | 37,261 | 60,145 | 181,286 | 191,309 | | |

1/ The figures in parenthesis in column 1 are taken from the 1943 calculation of production units and those in parenthesis in column 5 are taken from the 1945 calculation. The figures in parenthesis in column 6 are derived by adding the figures in columns 2 to 5 inclusive, and those in parenthesis in column 7 are derived by adding the figures in columns 1 to 4 inclusive. The parenthesis serves only to show that the figures in parenthesis in a column are derived somewhat differently than the figures in the same column not in parenthesis. They are of equal importance otherwise.

2/ Million eggs instead of pounds.

The number of livestock on farms January 1 used in calculating production units is given in column 8. These are multiplied by factors from table 2 and the results are put in column 7. Then the percentages in table 3 are applied to the figures in column 7, and the resulting production units are put in columns 1 to 4 inclusive. The production units for these livestock are thus distributed for the year beginning on October 1 rather than on January 1. The figures for the October-December quarter (column 5), in parenthesis, are supplied from the 1945 calculations.

The production units include only the production on farms of the specified classes of livestock. Other livestock on farms, such as ducks and geese use grain. Also in towns and cities there are many animals including milk cows, horses and mules, chickens, and pets, which taken together use large quantities of concentrate feeds. There is no recent information as to their number, so they are omitted from the computation of production units. It is believed that in recent years they would total between 4 and 5 million units, compared with about 5-6 million units in 1925.

The figures on production units, by quarters, in table 5 may now be added across to complete the items in parenthesis in columns 6 and 7 for both the calendar year and for the crop year. The columns may then be added down to give the total units for each quarter of the year and for the full year.

The livestock production units from grain and other concentrates have been computed for the United States from 1925 to date by the method described. They are given by classes of livestock in tables 6 and 7, and by quarters of the year in table 8.

Table 6.- Units of livestock production on farms by classes of livestock, calendar year 1925 to 1947

| Class of livestock or product | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Million units | | | | | | | | | | |
| Milk | 20.6 | 21.2 | 21.6 | 21.8 | 22.5 | 22.7 | 23.4 | 23.6 | 23.8 | 23.1 | 23.0 |
| Other dairy cattle | 4.0 | 3.3 | 3.4 | 3.6 | 3.8 | 3.9 | 4.0 | 4.2 | 4.3 | 4.1 | 4.0 |
| Fat cattle | 10.9 | 10.1 | 9.4 | 9.3 | 7.7 | 6.8 | 6.6 | 6.5 | 6.6 | 5.9 | 5.5 |
| Other beef cattle | | | | | 2.0 | 4.1 | 4.3 | 4.6 | 5.1 | 5.1 | 4.8 |
| Hogs | 49.2 | 51.8 | 56.7 | 56.2 | 54.1 | 52.7 | 57.4 | 56.8 | 57.5 | 43.0 | 37.0 |
| Eggs | 15.7 | 16.8 | 17.4 | 17.4 | 17.0 | 17.6 | 17.3 | 16.3 | 16.0 | 15.5 | 15.1 |
| Chickens raised | 10.1 | 10.5 | 11.0 | 10.2 | 11.0 | 11.2 | 10.5 | 11.0 | 11.2 | 9.6 | 9.9 |
| Broilers | | | | | | | | | | .3 | .4 |
| Turkeys | .8 | .8 | .8 | .8 | 1.0 | .9 | 1.0 | 1.2 | 1.3 | 1.2 | 1.2 |
| Fat lambs | .5 | .6 | .5 | .6 | .6 | .7 | .7 | .7 | .7 | .7 | .7 |
| Stock sheep | .9 | 1.0 | 1.1 | 1.1 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Horses and mules | 27.4 | 26.6 | 25.7 | 24.8 | 24.1 | 23.3 | 22.6 | 21.9 | 21.3 | 20.8 | 20.1 |
| Total | 140.1 | 142.7 | 147.6 | 145.8 | 145.0 | 145.2 | 149.1 | 148.1 | 149.1 | 130.6 | 123.0 |

| Class of livestock or product | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Million units | | | | | | | | | | | |
| Milk | 23.3 | 23.1 | 24.0 | 24.3 | 24.8 | 26.2 | 27.0 | 26.7 | 26.8 | 27.6 | 27.2 | 27.3 |
| Other dairy cattle | 4.0 | 4.0 | 4.2 | 4.4 | 4.6 | 4.8 | 5.0 | 5.2 | 5.2 | 5.0 | 4.8 | 4.8 |
| Fat cattle | 6.8 | 6.5 | 7.3 | 7.5 | 8.3 | 9.0 | 9.4 | 9.5 | 9.1 | 9.6 | 9.3 | 9.1 |
| Other beef cattle | 4.6 | 4.5 | 4.3 | 4.4 | 4.7 | 5.0 | 5.5 | 6.1 | 6.5 | 6.4 | 6.2 | 5.8 |
| Hogs | 45.0 | 43.4 | 49.9 | 59.3 | 59.1 | 60.7 | 73.2 | 88.1 | 71.4 | 66.3 | 66.3 | 65.2 |
| Eggs | 15.5 | 16.9 | 16.8 | 17.5 | 17.9 | 18.8 | 21.9 | 24.5 | 26.3 | 25.1 | 25.0 | 24.7 |
| Chickens raised | 10.8 | 9.5 | 10.0 | 10.7 | 10.1 | 11.9 | 13.8 | 16.4 | 14.0 | 15.3 | 12.7 | 12.4 |
| Broilers | .5 | .6 | .8 | 1.0 | 1.3 | 1.8 | 2.2 | 2.7 | 2.5 | 3.3 | 2.7 | 2.8 |
| Turkeys | 1.7 | 1.5 | 1.6 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.4 | 3.1 | 3.0 | 2.3 |
| Fat lambs | .7 | .7 | .8 | .7 | .7 | .8 | .9 | .8 | .8 | .9 | .8 | .7 |
| Stock sheep | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.0 | .9 | .9 |
| Horses and mules | 19.3 | 18.6 | 17.9 | 17.4 | 17.0 | 16.6 | 16.2 | 15.8 | 15.1 | 14.3 | 13.3 | 12.1 |
| Total | 133.4 | 130.5 | 138.8 | 150.4 | 151.9 | 159.0 | 178.5 | 199.2 | 181.3 | 177.9 | 172.2 | 168.1 |

Table 7.- Units of livestock production on farms by classes of livestock, feeding year, 1924-25 to 1946-47

| Class of livestock or product | 1924-25 | 1925-26 | 1926-27 | 1927-28 | 1928-29 | 1929-30 | 1930-31 | 1931-32 | 1932-33 | 1933-34 | 1934-35 | 1935-36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -----Million units---- | | | | | | | | | | | |
| Milk | 20.5 | 21.0 | 21.5 | 21.7 | 22.2 | 22.6 | 23.2 | 23.5 | 23.7 | 23.3 | 23.0 | 23.2 |
| Other dairy cattle | 3.3 | 3.3 | 3.3 | 3.5 | 3.7 | 3.9 | 3.9 | 4.1 | 4.3 | 4.3 | 4.0 | 4.0 |
| Fat cattle | 11.3 | 10.4 | 9.6 | 9.2 | 9.4 | 6.8 | 6.6 | 6.3 | 6.8 | 6.3 | 4.9 | 7.0 |
| Other beef cattle | | | | | | 4.0 | 4.2 | 4.4 | 4.9 | 5.4 | 4.8 | 4.7 |
| Hogs | 50.5 | 51.1 | 53.6 | 56.8 | 55.2 | 53.3 | 54.6 | 57.0 | 58.5 | 51.0 | 36.7 | 42.1 |
| Eggs | 15.7 | 16.4 | 17.2 | 17.4 | 17.2 | 17.4 | 17.4 | 16.7 | 16.1 | 15.7 | 15.3 | 15.4 |
| Chickens raised | 10.0 | 10.4 | 10.9 | 10.4 | 10.8 | 11.2 | 10.7 | 10.9 | 11.1 | 10.0 | 9.9 | 10.6 |
| Broilers | | | | | | | | | | .2 | .4 | .5 |
| Turkeys | .8 | .8 | .8 | .8 | .9 | 1.0 | 1.0 | 1.1 | 1.3 | 1.3 | 1.2 | 1.5 |
| Fat lambs | .5 | .6 | .5 | .6 | .6 | .7 | .7 | .8 | .7 | .7 | .7 | .7 |
| Stock sheep | .9 | 1.0 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 |
| Horses and mules 2+ | 27.4 | 26.6 | 25.7 | 24.9 | 24.0 | 23.4 | 22.6 | 21.9 | 21.3 | 20.8 | 20.1 | 19.3 |
| Colts | .2 | .2 | .2 | .2 | .2 | .2 | .2 | .1 | .1 | .2 | .2 | .2 |
| Total | 141.1 | 141.8 | 144.3 | 146.6 | 145.4 | 145.7 | 146.4 | 148.1 | 150.1 | 140.5 | 122.4 | 130.4 |

| Class of livestock or product | 1936-37 | 1937-38 | 1938-39 | 1939-40 | 1940-41 | 1941-42 | 1942-43 | 1943-44 | 1944-45 | 1945-46 | 1946-47 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ----Million Units ---- | | | | | | | | | | |
| Milk | 23.2 | 24.9 | 24.2 | 24.7 | 25.8 | 26.7 | 26.8 | 26.8 | 27.3 | 27.3 | 27.3 |
| Other dairy cattle | 4.0 | 4.0 | 4.3 | 4.5 | 4.7 | 4.9 | 5.1 | 5.3 | 5.1 | 4.8 | 4.8 |
| Fat cattle | 6.1 | 7.3 | 7.3 | 8.0 | 8.9 | 9.2 | 9.8 | 8.8 | 9.7 | 9.3 | 9.5 |
| Other beef cattle | 4.6 | 4.4 | 4.3 | 4.5 | 4.8 | 5.1 | 5.8 | 6.4 | 6.4 | 6.3 | 6.1 |
| Hogs | 43.9 | 51.0 | 54.8 | 61.3 | 58.5 | 67.1 | 83.8 | 81.5 | 64.8 | 67.7 | 65.6 |
| Eggs | 16.4 | 17.7 | 17.3 | 17.7 | 18.5 | 20.9 | 23.7 | 25.8 | 25.5 | 25.1 | 24.8 |
| Chickens raised | 9.8 | 9.9 | 10.5 | 10.3 | 11.5 | 13.4 | 15.8 | 14.6 | 15.0 | 13.3 | 12.5 |
| Broilers | .6 | .7 | .9 | 1.3 | 1.7 | 2.1 | 2.6 | 2.5 | 3.2 | 2.8 | 2.7 |
| Turkeys | 1.6 | 1.6 | 1.9 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.8 | 3.0 | 2.6 |
| Fat lambs | .7 | .8 | .7 | .7 | .8 | .9 | .9 | .8 | .9 | .8 | .7 |
| Stock sheep | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | .9 |
| Horses and mules 2+ | 18.6 | 17.8 | 17.3 | 16.9 | 16.4 | 16.1 | 15.7 | 15.2 | 14.5 | 13.5 | 12.3 |
| Colts | .2 | .2 | .2 | .2 | .2 | .2 | .2 | .1 | .1 | .1 | .1 |
| Total | 130.9 | 141.5 | 144.9 | 153.4 | 155.2 | 170.0 | 193.6 | 191.3 | 176.4 | 175.0 | 169.9 |

Table 8.- Units of livestock production on farms, by quarters, 1924-47

| Year | January-March | April-June | July-September | October-December | Calendar year | Year beginning October 1 |
|---|---|---|---|---|---|---|
| | ------- Million units ------- | | | | | |
| 1924 | 39.3 | 25.5 | 25.0 | 54.1 | 143.9 | 141.1 |
| 1925 | 36.6 | 24.9 | 25.5 | 53.1 | 140.1 | 141.8 |
| 1926 | 37.6 | 24.6 | 26.4 | 54.1 | 142.7 | 144.3 |
| 1927 | 38.2 | 25.0 | 27.0 | 57.4 | 147.6 | 146.6 |
| 1928 | 38.7 | 24.9 | 25.6 | 56.6 | 145.8 | 145.5 |
| 1929 | 38.5 | 24.6 | 25.8 | 56.1 | 145.0 | 145.7 |
| 1930 | 38.9 | 24.7 | 26.0 | 55.7 | 145.3 | 146.4 |
| 1931 | 39.2 | 24.7 | 26.8 | 58.4 | 149.1 | 148.1 |
| 1932 | 39.2 | 24.6 | 25.9 | 58.4 | 148.1 | 150.0 |
| 1933 | 40.4 | 25.1 | 26.1 | 57.5 | 149.1 | 140.5 |
| 1934 | 38.1 | 22.8 | 22.1 | 47.6 | 130.6 | 122.4 |
| 1935 | 32.6 | 20.7 | 21.5 | 48.3 | 123.1 | 130.3 |
| 1936 | 35.7 | 22.4 | 23.9 | 51.4 | 133.4 | 130.8 |
| 1937 | 35.1 | 21.9 | 22.4 | 51.1 | 130.5 | 141.5 |
| 1938 | 35.9 | 25.1 | 29.4 | 48.3 | 138.7 | 144.9 |
| 1939 | 37.7 | 26.8 | 32.1 | 53.8 | 150.4 | 153.4 |
| 1940 | 40.6 | 27.5 | 31.5 | 52.4 | 152.0 | 155.3 |
| 1941 | 41.2 | 28.1 | 33.6 | 56.1 | 159.0 | 170.0 |
| 1942 | 44.6 | 31.2 | 38.1 | 64.5 | 178.4 | 193.5 |
| 1943 | 50.3 | 34.5 | 44.2 | 70.2 | 199.2 | 191.3 |
| 1944 | 51.3 | 32.5 | 37.3 | 60.2 | 181.3 | 176.4 |
| 1945 | 46.2 | 30.1 | 39.9 | 61.7 | 177.9 | 175.0 |
| 1946 | 46.5 | 29.9 | 36.9 | 58.8 | 172.1 | 169.9 |
| 1947 | 45.2 | 29.2 | 36.7 | 57.0 | 168.1 | --- |

## Use of Production Units

The principal use of production units is to estimate future requirements of feed, for a year or for a quarter of a year, for a given volume of livestock production. An example of use is given. It may be desirable to make an estimate of how much feed will be required in the feeding year 1947-48 for the livestock in the United States. Tables are prepared (similar to tables 4 and 5) with the number of hogs on January 1, 1948, assumed number of pigs to be saved in 1948, and assumed numbers on hand December 31, 1948. The average weight per head of barrows and gilts to be marketed is also assumed for each quarter. The live weight production of hogs for 1948 may be calculated as shown in table 9. There were 55.0 million head of hogs on January 1, 1948. Of these 19.0 million are from the spring crop of pigs of 1947, 27.3 million are from the 1947 fall crop of pigs, and 8.7 million are in the breeding herd of which 3.2 million are sows and 5.5 million are gilts. We may also assume a pig crop of 80 million head in 1948 (48 million spring and 32 million fall) with 9.3 million deaths, and 59.2 million on hand January 1, 1949 of which 20.2 are from the spring pig crop of 1948, 28.2 from the fall pig crop and 10.8 million in the breeding year of which 5.3 million are gilts. Assuming that the average weight of barrows and gilts at 7 markets for the first quarter of 1948 is 250 pounds, and for the 6 months April to September is 245 pounds, and assuming 225 pounds for the October-December quarter, the live weight production for the calendar year 1948 will be found to be 17.4 billion pounds and the production units 60.5 million units.

The production units for other kinds of livestock are computed in table 10 which is similar to table 5. There were 78.6 million cattle on farms January 1, 1948. This total is made up of 25.2 milk cows, 12.2 heifers and heifer calves kept for milk, 3.8 million cattle on feed and 37.4 million other beef cattle, 30.5 million stock sheep and 4.8 million sheep and lambs on feed, 9.2 million horses and mules including colts. The production assumed for 1948 was 118 billion pounds of milk, 53,700 million eggs, 592 million chickens raised at 4.3 pounds each, 232 million broilers at 3.0 pounds each, 26.7 million turkeys at 17.2 pounds each. The figures in column 1 for milk, hogs, and poultry are from the 1946-47 calculation. The figures in column 5 for young dairy cattle, cattle on feed, other beef cattle, sheep, and horses and mules were arrived at by assuming numbers of beef cattle and horses and mules January 1, 1949 somewhat lower than on January 1, 1948. The total production units for 1947-48 (as computed in table 10) adds to 159.9 million units. This compares with 169.9 in 1946-47, 175.0 in 1945-46.

The quantity of concentrates to be required may be estimated by multiplying by the estimated quantity of feed required per unit. In 1942-43, there were 142.7 million tons of concentrates fed for 193.6 million production units or 1,474 pounds per unit (table 11). In 1943-44, the feeding rate was 1,455 pounds, in 1944-45, 1,468 pounds. In 1945-46, the feeding rate was 1,529 pounds and in 1946-47 was 1,482 pounds. A large quantity of soft corn in 1945 was of poor feeding value. If we assume a rate of

Table 9.- Estimate of net live weight production and production units of hogs by quarters, 1948

| Item | Number of hogs | Weight per head | | | | Total live weight produced | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Beginning of year | When slaughtered | End of year | Gain in weight | Calendar year | January-March | April-June | July-September | October-December |
| | Million head | Pounds | Pounds | Pounds | Pounds | Million pounds | Million pounds | Million pounds | Million pounds | Million pounds |
| Hogs on farm January 1, 1948 | | | | | | | | | | |
| Spring pigs | 19.0 | 190 | 250 | | 60 | 1,140 | 1,140 | | | |
| Fall pigs | 27.3 | 90 | 245 | | 155 | 4,231 | 2,184 | 1,092 | 955 | |
| Sows | 3.2 | 300 | 375 | | 75 | 240 | 80 | 80 | 48 | 32 |
| Gilts | 5.5 | 190 | | 300 | 110 | 605 | 137 | 138 | 165 | 165 |
| Total | 55.0 | | | | | | | | | |
| Hogs from current pig crop on farms Dec. 31 | | | | | | | | | | |
| Spring pigs | 20.2 | | | 190 | 190 | 3,838 | | 404 | 1,212 | 2,222 |
| Fall pigs | 28.2 | | | 90 | 90 | 2,538 | | | 282 | 2,256 |
| Gilts (10.8-5.5) | 5.3 | | | 190 | 190 | 1,007 | 53 | 159 | 318 | 477 |
| Deaths | 9.3 | | | | | | | | | |
| Sold or unaccounted | 17.0 | | 225 | | 225 | 3,825 | 170 | 680 | 1,275 | 1,700 |
| Pigs saved | 80.0 | | | | | | | | | |
| Estimated live weight produced | | | | | | 17,424 | 3,764 | 2,553 | 4,255 | 6,852 |
| | | | | | | ------ Thousands ------- | | | | |
| Estimated production units | | | | | | 60,461 | 13,061 | 8,859 | 14,765 | 23,776 |

Table 10.- Calculation of livestock production units, 1947-48

| Item | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | Production units | | | | | | Year beginning October 1, 1947 | Number of livestock Jan. 1, 1948 | Production in 1948 |
| | 1947-October-December | January-March | April-June | July-September | October-December | Calendar year 1948 | | | |
| | ------ Thousand ------ | | | | | | | Thousand head | Million pounds |
| Milk | 1/(8,206) | 9,375 | 5,357 | 4,018 | 8,036 | 26,786 | (26,956) | | 118,000 |
| Young dairy cattle | 2,373 | 2,136 | 237 | | (2,400) | (4,773) | 4,746 | 12,170 | |
| Cattle on feed | 2,491 | 3,322 | 1,245 | 1,245 | (2,600) | (8,412) | 8,303 | 3,774 | |
| Other beef cattle | 2,996 | 2,697 | 300 | | (2,800) | (5,797) | 5,993 | 37,465 | |
| Hogs | (25,171) | 13,061 | 8,859 | 14,765 | 23,776 | 60,461 | (61,856) | | |
| Eggs | (7,891) | 6,766 | 4,833 | 4,833 | 7,733 | 24,165 | (24,323) | | 2/53,700 |
| Chickens raised | (3,102) | 1,489 | 1,986 | 3,972 | 2,482 | 9,929 | (10,549) | | 2,546 |
| Broilers | (557) | 780 | 668 | 334 | 445 | 2,227 | (2,339) | | 696 |
| Turkeys | (1,033) | 94 | 94 | 847 | 847 | 1,882 | (2,068) | | 459 |
| Lambs on feed | 239 | 239 | 60 | 60 | (250) | (609) | 598 | 4,788 | |
| Stock sheep | 330 | 495 | | | (340) | (835) | 825 | 30,544 | |
| Horses and mules 2 years old and over | 2,839 | 2,271 | 3,406 | 2,839 | (2,600) | (11,116) | 11,355 | 8,680 | |
| Colts | | | | | | | | 471 | |
| Total | 57,228 | 42,725 | 27,045 | 32,913 | 54,309 | 156,992 | 159,911 | | |

1/See footnote 1, table 5 for meaning of parenthesis.
2/ Million eggs.

Table 11.- Concentrates fed per production unit, feeding year 1926-27 to 1946-47

| Year | Production units in year | Concentrates fed in year | Concentrates fed per production unit 1/ |
|---|---|---|---|
| | Million units | Million tons | Pounds |
| 1926-27 | 144.3 | 103.1 | 1,428 |
| 1927-28 | 146.6 | 107.3 | 1,464 |
| 1928-29 | 145.4 | 107.0 | 1,472 |
| 1929-30 | 145.7 | 104.6 | 1,436 |
| 1930-31 | 146.4 | 95.6 | 1,306 |
| 1931-32 | 148.1 | 104.2 | 1,407 |
| 1932-33 | 150.1 | 111.4 | 1,484 |
| 1933-34 | 140.5 | 92.1 | 1,311 |
| 1934-35 | 122.4 | 71.6 | 1,170 |
| 1935-36 | 130.4 | 94.7 | 1,452 |
| 1936-37 | 130.9 | 75.9 | 1,160 |
| 1937-38 | 141.5 | 97.0 | 1,371 |
| 1938-39 | 144.9 | 99.6 | 1,375 |
| 1939-40 | 153.4 | 102.9 | 1,342 |
| 1940-41 | 155.2 | 108.6 | 1,399 |
| 1941-42 | 170.0 | 119.0 | 1,400 |
| 1942-43 | 193.6 | 142.7 | 1,474 |
| 1943-44 | 191.3 | 139.2 | 1,455 |
| 1944-45 | 176.4 | 129.5 | 1,468 |
| 1945-46 | 175.0 | 133.8 | 1,529 |
| 1946-47 | 169.9 | 125.9 | 1,482 |

1/ Includes feed grains, wheat, rye, oilseed cake and meal, animal protein feeds including skim milk, and other byproduct feeds as used in the feed balance table in The Feed Situation (issued periodically by B.A.E.).

The production units are those on farms only while the concentrates fed are the total quantity fed to all livestock including that in cities.

1,450 pounds for 1947-48, we find that it will require 115.9 million tons of concentrates for feed for the assumed 159.9 million production units in the year beginning October 1, 1947.

Another estimate that can be made with the use of production units is the quantity of feed grains that will be fed by quarters of the year. The bushels of corn, oats, barley, wheat, and rye that disappeared for feed in a given quarter can be compared with the production units in that quarter for several years, and a reasonable estimate can then be made for some future quarter.

For instance, in the January-March quarter for the years 1942 to 1947 the quantity of corn (excluding silage) that is estimated to have disappeared for feed production unit was 16.0 bushels in 1942, 15.6 bushels in 1943 and 15.5 bushels in 1944, 14.9 bushels in 1945, 16.2 bushels in 1946, and 16.4 bushels in 1947. A reasonable estimate for 1948 in view of the short supply would be 14.5 bushels for each of the42.7 million units expected, or a total of 619 million bushels of corn to be fed in the first quarter of 1948. A similar estimate can be made for other grain.

As different grains may be substituted for each other, a better estimate can be made of all grains combined. The total quantity of corn (excluding corn in silage), oats, barley, wheat, and rye fed per unit in the January-March quarter of the 5-year period 1942-46 was 1,272 pounds, in the April-June quarter 1,176 pounds, in the July-September quarter 1,101 pounds, and in the October-December quarter 1,152 pounds. These total quantities may be used as a guide in estimating the total quantity fed of the 5 grains added together in some future quarter.

Livestock production units may also be used for estimating how large a volume of livestock production a given acreage of feed grains in the United States will support, assuming specified yields of grain. This involves computing the production of feed grains and estimating the quantity of other concentrates to be fed, and assuming a specified carry-over of feed grains at the end of the year. Then an estimate is made of the number of cattle, sheep, and horses and mules on farms January 1. The pig crops and poultry and milk production may be assumed at different levels until a total number is found that will leave the desired carry-over of feed, with the assumed supply of feed.